UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,476	09/15/2003	Marc Ferrato	Q77425	9244

23373 7590 12/11/2006

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER	
BAREFORD, KATHERINE A	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 12/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/661,476	FERRATO ET AL.	
	Examiner	Art Unit	
	Katherine A. Bareford	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-10,12-14 and 16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 4, 11 and 15 are canceled

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 15, 2006 has been entered.

The amendment filed with the RCE submission has been received and entered. With the amendment, claims 4, 11 and 15 are canceled, and claims 1-3, 5-~~11~~ 10, 12-14 and 16 (including new claim 16) are present for examination.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the

various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. The rejection of claims 1-3, 5-8, 10 and 15 under 35 U.S.C. 103(a) as being unpatentable over Schultze et al (US 4460529) in view of Knudsen et al (US 5273699) and the admitted state of the prior art is withdrawn due to applicant's amendments to claim 1 of November 15, 2006 requiring the metal support and attachment sublayer.

5. The rejection of claim 9 under 35 U.S.C. 103(a) as being unpatentable over Schultze in view of Knudsen and the admitted state of the prior art as applied to claims 1-3, 5-8, 10 and 15 above, and further in view of Okano et al (US 5045365) is withdrawn due to applicant's amendments to claim 1 of November 15, 2006 requiring the metal support and attachment sublayer..

6. The rejection of claims 12-14 under 35 U.S.C. 103(a) as being unpatentable over Schultze in view of Knudsen and the admitted state of the prior art as applied to claims 1-3, 5-8, 10 and 15 above, and further in view of Dittrich et al (US 3617358) is withdrawn

due to applicant's amendments to claim 1 of November 15, 2006 requiring the metal support and attachment sublayer..

7. Claims 1-3, 5-8, 10 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breit et al (US 4460529) in view of Knudsen et al (US 5273699).

Breit teaches a method of fabricating a substrate that can be an aluminum nitride substrate for use as a support for electronic components. Column 2, lines 5-20 and figures 2-3. The substrate is obtained by spraying a powder onto a support at a high temperature and a high speed. Column 4, lines 5-65 (the plasma spraying). The powder can include AlN grains. Column 5, lines 35-50. After the substrate is formed, circuits, etc. are applied, fired and then the ceramic layer is sealed to exclude moisture. Column 2, lines 25-35. The support can be metal, and an intermediate layer can be provided on the support between the support between the support and the aluminum nitride layer, which is applied to the intermediate layer. See column 6, lines 1-30 and figure 4 (for example, the support can be a core 54.2 of copper covered with a layer 54.1 of molybdenum, with layer 56 of the electrically insulating aluminum nitride, for example, on top). As to the intermediate layer being an attachment layer, the Examiner takes Official Notice that it is well known in the art of thermal spraying that molybdenum is a bond coat material that increases "attachment" of an overcoated layer to a substrate. Thus, Breit teaches the use of intermediate layers that will inherently act

as "attachment" layers, given the taught molybdenum's known use as a bond coat material.

Claim 2: the powder can be sprayed by a plasma torch (plasma spraying). Column 4, lines 10-65.

Claim 3: other thermal spraying processes can be used. Column 4, lines 10-15.

Claim 8: the substrate can be obtained by providing a plurality of passes over the support as a function of the required thickness. Column 4, lines 35-40.

Claim 10: the substrate can be fired after spraying, thus providing the "annealing". Column 5, lines 1-20 and column 2, lines 25-35.

Claim 16: the aluminum nitride layer can have a thickness of 0.005 inches, which would be 0.127 mm, within the claimed range of applicant. Column 4, lines 55-65.

Breit teaches all the features of these claims except (1) the use of the oxide precursor, (2) spraying with an oxyacetylene torch (claim 3), (3) the specific formation of the powder and the materials used (claims 1 and 5-7).

However, Knudsen teaches a method of forming an aluminum nitride powder. Abstract. Knudsen teaches that it is desirable to make the powder moisture resistant by treating with a yttrium containing compound, thus preventing storage problems for the powder. Column 2, lines 5-20 and 35-45. The yttrium compound can be a rare earth oxide precursor, such as yttrium isopropoxide. Column 3, lines 10-20. The compound can be applied to the aluminum nitride powder by (1) dissolving the yttrium compound in an organic solvent forming a solution, (2) then dispersing fine pure AlN powder in

the solution with vigorous agitation to form a suspension, (3) then atomizing the suspension in an inert atmosphere (vacuum, for example) to obtain the treated powder. Column 3, line 15 through column 4, line 10 and column 5, line 65 through column 6, line 10. The treated powder can contain yttrium oxide in an amount of 0.1 to 10 % by weight of the aluminum nitride. Column 3, lines 5-15. The solvent can be isopropanol (which would be form of propanol). Column 3, lines 45-50.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Breit to use the treated aluminum nitride powder as taught by Knudsen, in order to provide a desirable substrate using a moisture resistant powder, because Breit teaches the desire to form aluminum nitride articles by plasma spraying aluminum nitride powder, and Knudsen teaches that a desirable moisture resistant aluminum nitride powder can be formed by treating with yttrium oxide precursor. It would have been inherent when plasma spraying such a powder that the oxide precursor would have yielded an oxide, given the high heat of the plasma spraying. It would further have been obvious to modify Breit in view of Knudsen to use a flame spraying oxyacetylene torch to replace the plasma torch with an expectation of desirable spraying results, because Breit teaches thermal spraying of various forms can be used and it is the Examiner's position that it is well known in the thermal spraying art that plasma and flame spraying with an oxyacetylene torch are both well known desirable methods of thermal spraying. It would further have been obvious to modify Breit in view of Knudsen to perform routine experimentation to optimize the

amount of yttrium oxide content from the range taught by Knudsen of 0.1 to 10% by weight, given the desire to use the best amount for the particular purpose of applicant. It would further have been obvious to modify Breit in view of Knuden to use yttrium isopropionate as the oxide precursor, with an expectation of desirable protective results, because Knudsen teaches the use of yttrium compounds that convert to oxides (column 3, lines 10-20) and it is the Examiner's position that isopropionates are well known oxide precursor compounds in the chemical art.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Breit in view of Knudsen as applied to claims 1-3, 5-8, 10 and 16 above, and further in view of Okano et al (US 5045365).

Breit in view of Knudsen teaches all the features of this claim except the cooling of the support by compressed air while spraying.

However, Okano teaches that when coating an article to be thermally sprayed, the conventional method is to spray compressed air on the back of the substrate surface. Column 3, lines 1-20.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Breit in view of Knudsen to use compressed air for cooling as taught by Okano, in order to provide a desirable cooling of the substrate without having to use liquid, because Breit in view of Knudsen teaches the thermal

spraying of a metal support, and Okano teaches that when thermal spraying a support, it is conventional to cool the support by compressed air.

9. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Breit in view of Knudsen as applied to claims 1-3, 5-8, 10 and 16 above, and further in view of Dittrich et al (US 3617358).

Breit in view of Knudsen teaches all the features of these claims except the particle formation features and particle sizes.

However, Dittrich teaches making flame spray powders where finely divided material is suspended in liquid, the suspension is atomized and the atomized suspension is dried to form a flame spray powder. Column 1, line 75 through column 2, lines 10. The initial particle sizes can be between 1 and 15 microns. See column 2, lines 5-10 and column 3, lines 40-45. For example, the particle size can be approximately 3 microns. Column 17, lines 60-70. After the atomization and drying, the formed particles can be formed with diameters in the range of 140 mesh to 325 mesh (106 to 45 microns). Column 18, lines 30-45, for example. The formed powder is then screened to use particles of the desired size for spraying, such as 200-325 mesh (75-45 microns). Column 18, lines 55-60. The particles formed can also be hollow. Column 19, lines 5-15.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Breit in view of Knudsen to use initial and final particle sizes, and to use hollow spheres as taught by Dittrich, in order to provide a thermal

spray powder, because Breit in view of Knudsen teaches the thermal spraying of formed AlN powders, with Knudsen teaching a liquid dispersion and spray atomization to form AlN powders, and Dittrich teaches to form liquid dispersions of particles and spray atomize to form thermal spray powders, and that when doing so it is desirable to start with fine powders, such as in the 3 micron size range, which are agglomerated by the spray atomization and drying to form larger particles, such as 45-106 micron in size range, and to further screen the powder to the size desired for thermal spraying. Dittrich further teaches that hollow spheres can be formed, and it would have been obvious to one of ordinary skill in the art that such hollow spheres would also be screened as desired to form a specific coating, given the teaching of Dittrich to screen formed powders to get those desired for thermal spraying.

10. Thermal Spraying: Practice, Theory, and Application, page 27, teaches that molybdenum is a well known bond coating material to increase adherence of a subsequently applied thermal spray coating. See sections 3.8 and 3.8.3.

Response to Arguments

11. Applicant's arguments filed November 15, 2006 have been fully considered but they are not persuasive.

(A) As to the 35 USC 103 rejection of claims 1-3, 5-8, 10 and 15 using Schultze in view of Knudsen, claim 9 using Schultze in view of Knudsen and further in view of

Okano, and claims 12-14 using Schultze in view of Knudsen and further in view of Dittrich, these rejections have been withdrawn due to applicant's amendments to claim 1 of November 15, 2006 requiring the metal support and attachment sublayer.

(B) As to the 35 USC 103 rejection of claims 1-3, 5-8, 10 and 16 using Breit in view of Knudsen, applicant argues that the combination of references does not teach or suggest providing an attachment layer on a metal support. Furthermore, as to claim 16 applicant argues that the claim requires that the fabricated AlN substrate has a thickness of 0.1 mm to 0.5 mm (at pages 5-6 of the amendment applicant notes that this thickness refers to the applied AlN layer thickness), and that the cited references do not teach or suggest this thickness. The Examiner has reviewed these arguments, however, the rejection is maintained. As discussed in the rejection above, it is the Examiner's position that Breit teaches a layer structure that provides a metal support with an intermediate "attachment" layer on the support, and that the AlN layer is applied on to this intermediate layer. See column 6, lines 1-30 and figure 4 (for example, the support can be a core 54.2 of copper covered with a layer 54.1 of molybdenum, with layer 56 of the electrically insulating aluminum nitride, for example, on top). As to the intermediate layer being an attachment layer, the Examiner has taken Official Notice that it is well known in the art of thermal spraying that molybdenum is a bond coat material that increases "attachment" of an overcoated layer to a substrate. Thus, Breit teaches the use of intermediate layers that will inherently act as "attachment" layers, given the taught molybdenum's known use as a bond coat material. Thus, an

"attachment" layer within the meaning of the claim is provided by Breit. As to claim 16, as discussed in the rejection above, Breit teaches that the aluminum nitride electrically insulating layer can have a thickness of 0.005 inches, which would be 0.127 mm, within the claimed range of applicant. Column 4, lines 55-65

(C) As to the 35 USC 103 rejection of claim 9 using Breit in view of Knudsen and further in view of Okano, and the rejection of claims 12-14 using Breit in view of Knudsen and further in view of Dittrich, applicant argues that the claims are patentable for the reasons given as to claim 1 and that Okano and Dittrich do not further cure the defects of Breit and Knudsen. The Examiner has reviewed these arguments, however, the rejection is maintained. As discussed in section (B) above, the rejection of claim 1 is maintained using Breit and Knudsen, and therefore, Okano and Dittrich do not need to cure defects.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KATHERINE BAREFORD
PRIMARY EXAMINER